

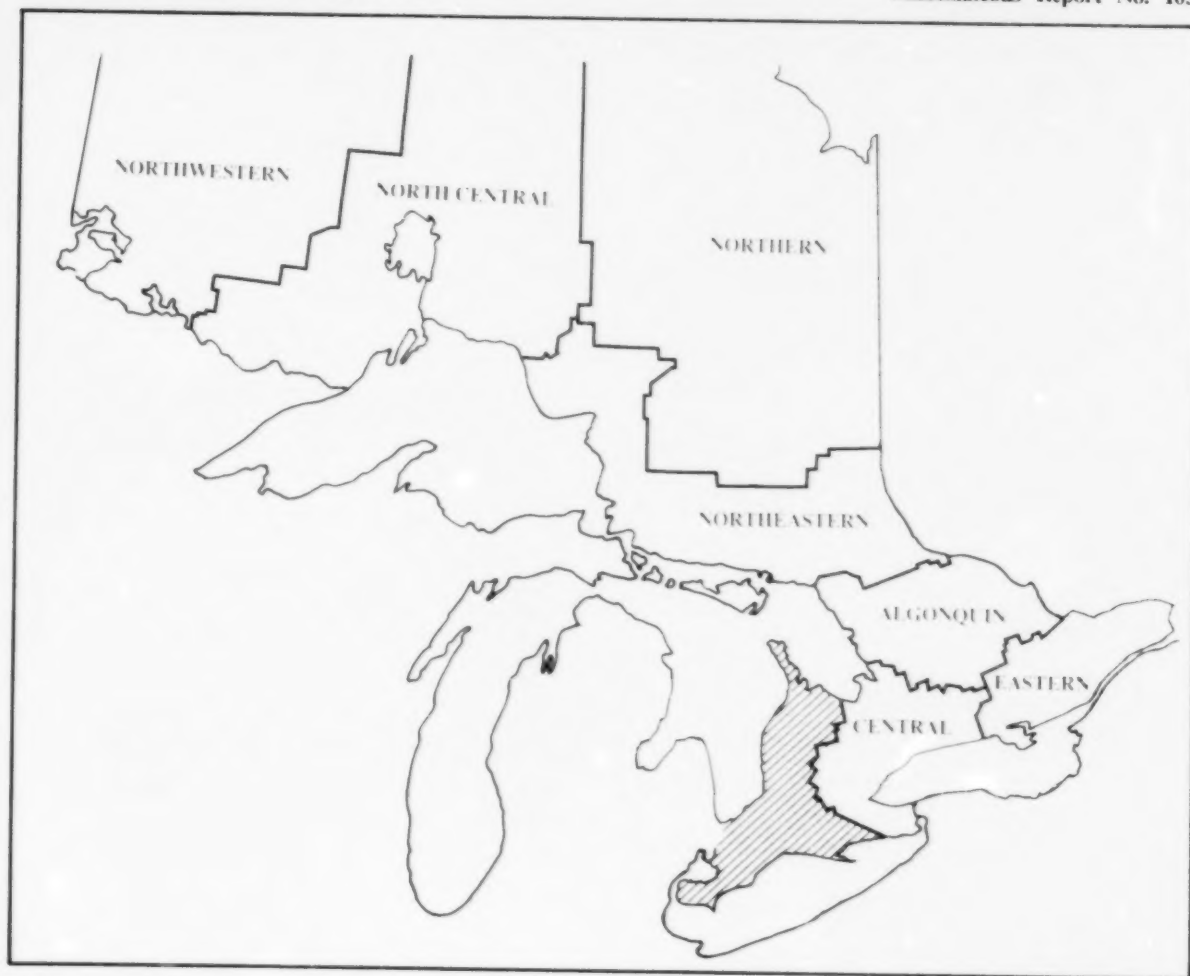


Results of forest insect and disease surveys in the SOUTHWESTERN REGION of Ontario, 1990

CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO
MINISTRY OF NATURAL RESOURCES

E.J. Czerwinski and W.D. Biggs

Miscellaneous Report No. 105



Forestry Canada
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FORESTRY CANADA, ONTARIO REGION

Ontario Region is one of six regional establishments located across Canada and operated by Forestry Canada. The overall objective of Forestry Canada is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. Ontario Region pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Ontario Region specializes in research in forest production, forest protection, forest environment and forest utilization. These programs deal directly with the issue of maintaining and enhancing the resource supply. Activities range from basic to applied and developmental research, and include a significant technology transfer component.

Major activities in forestry development include federal management responsibility for federal-provincial forest management agreements, participation in the National Forestry Statistics program and forest economics research.

Close working relationships are maintained with the Ontario Ministry of Natural Resources, the forest industry, educational institutions specializing in forestry and the biological sciences, and other forestry organizations within the province. Ontario Region is represented on the Ontario Forestry Council and the Ontario Forestry Research Committee, which have responsibility for coordinating forestry research in Ontario.

It is recognized that forested land must be managed in the best public interest, not only for the wood production essential to our economy, but also for the recreational purposes that are so important to our social well-being. This must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

**RESULTS OF FOREST INSECT AND
DISEASE SURVEYS IN THE
SOUTHWESTERN REGION OF ONTARIO
1990**

**(FOREST DISTRICTS: OWEN SOUND, WINGHAM, CHATHAM,
AYLMER and SIMCOE)**

E.J. Czerwinski and W.D. Biggs

**FORESTRY CANADA
ONTARIO REGION
GREAT LAKES FORESTRY CENTRE
1991**

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SURVEY HIGHLIGHTS

This report deals with forest insects, diseases and abiotic conditions encountered in the course of special and regular surveys carried out during the 1990 field season in the Southwestern Region of Ontario.

The most noteworthy and damaging pest in the Region was once again the forest tent caterpillar, which infested some 62,889 ha in Owen Sound District. Gypsy moth populations caused 3,906 ha of moderate-to-severe defoliation this year, down from 4,807 ha in 1989, although pockets of moderate-to-severe defoliation were more widespread in 1990. Spruce budworm populations increased, causing moderate defoliation in an 18-ha Agreement Forest in Wingham District. Cedar leafminer populations remained at endemic levels, as did oak leaf shredder populations. In stands that can be compared between years, white pine weevil populations continued to decline.

Special surveys for the European and native races of the *Scleroderris* canker fungus found no infections; however, *Diplodia* tip blight continues to be a problem on exotic pines. Many foliar diseases were common across the Region. Abiotic damage caused by wind, frost and ice was evident on a wide variety of hosts throughout the Region. Forest health plots continue to be monitored, and a general improvement was noted in the health of sugar maple in the Region. The plantation surveys and the seed and cone pest surveys for southern Ontario were discontinued this year. The results of inspections of the St. Williams Forest Tree Nursery and a summary of climatic data for the Region are also included in this report.

As in previous years, pests in this report are categorized as follows:

Major Insects/Diseases

capable of causing severe injury to or death of living trees or shrubs

Minor Insects/Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pests:

- (1) those that are of minor importance and have not been known to cause serious damage to forest trees
- (2) those that are capable of causing serious damage but have not done so because of low population levels or for other reasons.

The cooperation and assistance extended to the authors by staff of the Ontario Ministry of Natural Resources (OMNR), Conservation Authorities, the Canadian Parks Service, other government agencies and private individuals are gratefully acknowledged.

If further information or additional copies of this report are required please contact E. Czerwinski or the Chief of Survey, Forestry Canada, Forest Insect and Disease Survey, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7.

E.J. Czerwinski
W.D. Biggs



FRONTISPIECE



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INSECTS

Major Insects

Cedar Leafminers, *Argyresthia aureoargentella* Brower, *A. canadensis* Free.,
A. thuiella (Pack.) and *Coleotechnites thujaella* (Kft.)

Populations of these leafminers showed evidence of a slight resurgence on eastern white cedar (*Thuja occidentalis* L.) in Owen Sound District in 1990, but remained at low levels at all other locations in the Region. The highest levels of foliar browning (50 to 60%) were recorded in Eastnor and Bentinck townships. In most other stands through Sauble, Saugeen and Amabel townships in Owen Sound District, leafmining ranged from 10 to 20%. Elsewhere in the Region, populations were at endemic levels.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

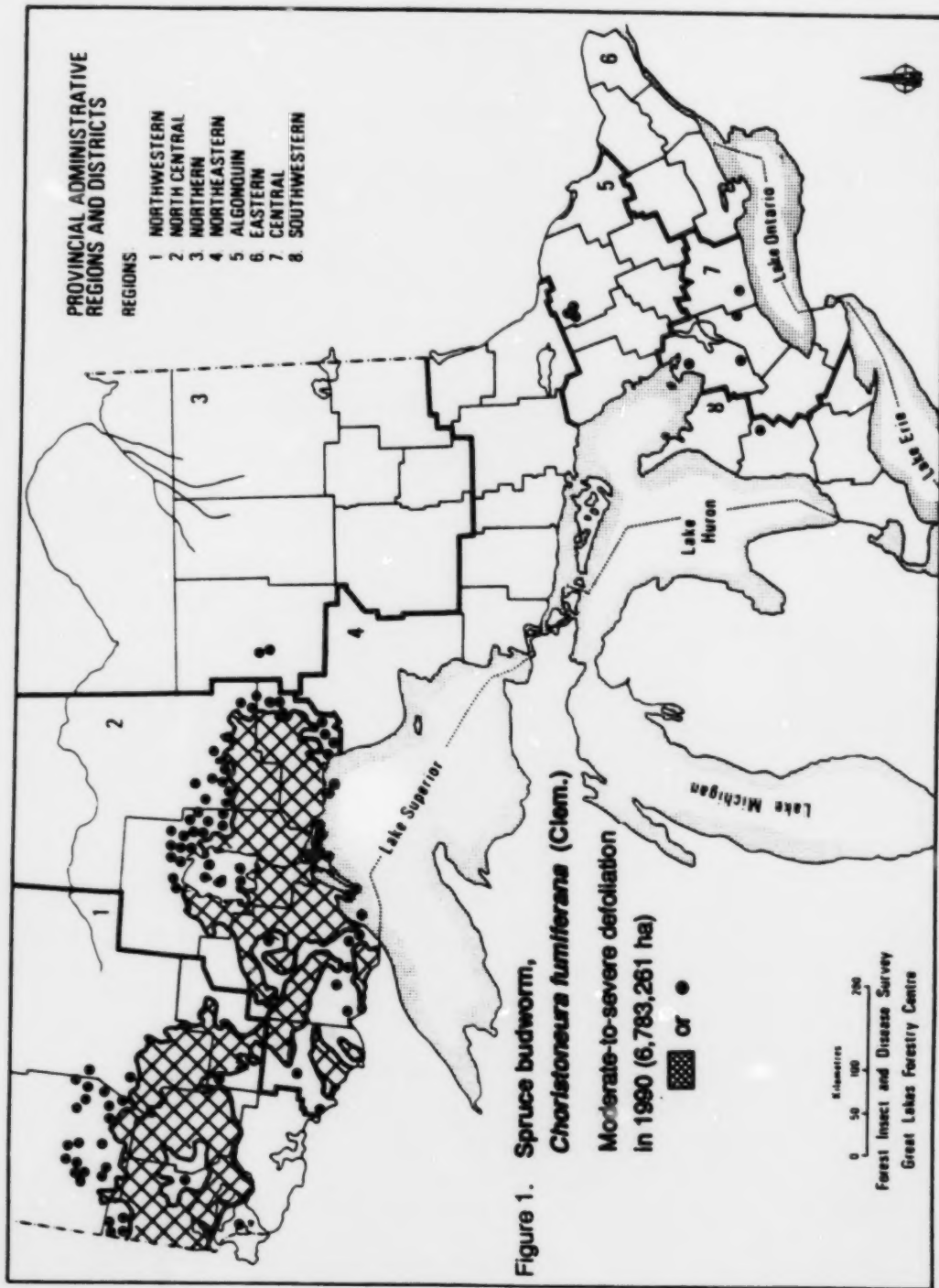
Provincial Situation

For the second consecutive year, an increase in the area of spruce budworm-defoliated stands was recorded in Ontario. In 1990, the overall area of moderate-to-severe defoliation increased to 6,783,261 ha from 6,239,636 ha in 1989 and was no longer confined to the Northwestern and North Central regions (Fig. 1). The majority of the defoliation occurred again in the Northwestern and North Central regions, with increases in the Terrace Bay, Geraldton, Nipigon, Thunder Bay and Red Lake districts; small decreases in the area defoliated were noted in the Atikokan, Ignace, Dryden, Sioux Lookout, Fort Frances and Kenora districts. Moderate-to-severe defoliation totaling 6,392 and 2,815 ha were recorded in Hearst District, Northern Region, and Algonquin Park District, Algonquin Region, respectively, and in a few small white spruce (*Picea glauca* [Moench] Voss) plantations in the Central and Southwestern regions.

Surveys in 1990 to determine the area of whole-tree and top mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce caused by the spruce budworm in the northwestern part of the province disclosed a total area of 3,098,189 ha, an increase of some 1,214,473 ha from 1989. Mortality that occurred during the previous outbreak (1972-1984) in the northeastern and southern parts of Ontario has been dropped from the cumulative totals since the outbreak has subsided for several years and the forests are in the process of recovering.

Southwestern Region

After remaining at endemic levels for 8 years, a notable population of the spruce budworm was recorded causing 10 to 20% defoliation in 1989 at one location in the Region. In 1990, populations continued to increase and caused moderate defoliation to current-year foliage on 15-m white spruce in an 18-ha plantation in the Smeale Tract of Minto Township, Wingham District. Defoliation averaged 33%, and was as high as 70% on some trees. Many other insects were found contributing to the total damage in the plantation.



including the orange spruce needleminer (*Coleotechnites piceaella* [Kft.]), the purplestriped shootworm (*Zeiraphera unfortunana* Powell), the spruce bud moth (*Zeiraphera canadensis* Mut. & Free.) and the redstriped needleworm (*Griselda radicans* Heinr.).

As in previous years, egg-mass sampling for the purpose of forecasting population levels was conducted at five locations in the Region. The results indicate that moderate damage is likely to recur in the spruce plantation in Minto Township, Wingham District, and to remain endemic at all other locations sampled.

Larch Casebearer, *Coleophora laricella* (Hbn.)

Population levels of this early-season defoliator of European larch (*Larix decidua* Mill.) and tamarack (*L. laricina* [Du Roi] K. Koch) recurred at high levels in 1990 in the Region.

Foliar damage ranged from 80 to 100% in mature European larch plantations approximately 5 ha in size through Charlotteville and South Walsingham townships, Simcoe District, and south of Kilworth in Delaware Township, Aylmer District. Moderate-to-severe foliar browning was also recorded in a 2-ha natural stand of semimature tamarack in Windham Township, Simcoe District. Similar damage levels were observed in scattered plantations in Owen Sound District. Moderate damage (26 to 75%) in the form of needle discoloration and premature needle drop was apparent on European larch in shelterbelts and windbreaks at the St. Williams Forest Tree Nursery, Simcoe District.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

Populations of the oak leaf shredder remained at endemic levels in Southwestern Region in 1990. Annual surveys in the oak plots in Bosanquet Township, Chatham District, and Charlotteville Township, Simcoe District, revealed no foliar damage on red oak (*Quercus rubra* L.) and black oak (*Q. velutina* Lam.) as a result of feeding by this pest.

The results of pheromone trapping and defoliation estimates in 1990, and of egg surveys to forecast infestations for 1991, are presented in Table 1. An analysis of the data indicates that populations of the oak leaf shredder will remain at low levels in the Chatham plot, and light defoliation is expected in the Simcoe plot.

Gypsy Moth, *Lymantria dispar* (L.)

Populations of the gypsy moth continued to increase in the Southwestern Region in 1990, even though the area of moderate-to-severe defoliation decreased. The most serious damage occurred in Simcoe District once again, with small pockets of moderate-to-severe defoliation in the Aylmer and Chatham districts.

Table 1. Results of oak leaf shredder pheromone trapping, defoliation estimates and egg counts in 1990, and defoliation forecasts for 1991 in the Southwestern Region of Ontario. (Five pheromone traps with a concentration level of 0.003% were deployed at each location.)

Location (Twp)	Number of adults caught		Leaves attacked in 1990 (%)	Foliar damage in 1990 (%)	Number of eggs		Infestation forecast for 1991
	1989	1990			1989	1990	
<u>Chatham District</u>							
Bosanquet	0	0	0	0	0	0	nil
<u>Simcoe District</u>							
Charlotteville	1	0	0	0	0	4	light

In 1990, the gypsy moth caused moderate-to-severe defoliation totaling 3,856 ha in parts of Charlotteville, North Walsingham and South Walsingham townships in Simcoe District, compared with 4,807 ha in 1989. The major body of the infestation moved north and east in 1990 and consisted of many different-sized pockets in woodlots in North Walsingham, Middleton and Charlotteville townships and in the southern part of Windham Township. Small pockets were also mapped north of Waterford in Townsend Township and east of Simcoe in Woodhouse Township (Fig. 2). Altogether, this represents only 5% of the 77,648 ha defoliated by gypsy moth in the province. Foliar damage across Simcoe District on deciduous and coniferous hosts was generally less severe than in 1989. Exceptions to this were a 9-ha area of oak west of Simcoe, which sustained 100% defoliation, and an area totaling 1,015 ha north of Highway 3 in Windham Township, which sustained 75 to 100% defoliation. In Charlotteville and Walsingham townships, where complete defoliation was recorded in 1989, defoliation levels this year ranged from 35 to 80% and averaged 45% in many of the woodlots. At Turkey Point Provincial Park, Charlotteville Township, Simcoe District, where a 170-ha area of an Oak-Savannah forest type sustained 100% defoliation, an impact cruise in June of 1990 revealed that 22.7% of the trees examined were dead. This mortality was primarily confined to a 60-ha area centered within the provincial park, where planted coniferous trees had been growing for several years. Of the 75 trees tallied, all the Norway spruce (*Picea abies* [L.] Karst.) and jack pine (*Pinus banksiana* Lamb.), and four of the 22 eastern white pine (*Pinus strobus* L.), were dead. Many deciduous trees sustained considerable branch dieback and four oaks revealed 20 to 50% top mortality (Table 2). For aesthetic reasons, all dead conifers were removed by park staff and a protective spray program was initiated in 1990. Defoliation of 20% was recorded this year.

SOUTHWESTERN REGION

PROVINCIAL ADMINISTRATIVE
DISTRICTS

1. OWEN SOUND
2. WINGHAM
3. CHATHAM
4. AYLMER
5. SIMCOE



Figure 2.

Gypsy moth,
Lymantria dispar (L.)

Areas within which moderate-to-severe defoliation
occurred in 1990  or 

Table 2. Gypsy moth-associated mortality, by tree species, based on ground checks in Turkey Point Provincial Park, Charlotteville Township, Simcoe District, in 1990.

Tree species	Avg. stand ht. (m)	Avg. DBH (cm)	Mortality			
			Total - - -	Whole-tree No. of trees	Top - - -	Mortality (%)
Norway spruce	21.0	22.0	7	7	0	100
Jack pine		15.1	5	5	0	100
Eastern white pine		18.1	22	4	0	18.2
Black oak		31.4	26	1 ^c	1	3.8
Red oak		25.3	3	0	1	0
White oak		36.9	8	0	2	0
Scots pine ^a		6.7	2	0	0	0
Black cherry ^b		16.7	2	0	0	0

^a *Pinus sylvestris* L.

^b *Prunus serotina* Ehrh.

^c windthrown

In Chatham District, severe (80 to 100%) defoliation of 20 ha of red oak, bur oak (*Q. macrocarpa* Michx.), shagbark hickory (*Carya ovata* [Mill.] K. Koch) and various other hardwoods was mapped in lots 3 and 4 in Concession 2 of Moore Township. Only light damage was recorded at these locations in 1989. Gypsy moth was recorded for the first time in Aylmer District, defoliating two pockets of trembling aspen (*Populus tremuloides* Michx.), red oak and eastern white pine totaling 30 ha in Bayham Township. Defoliation has not yet been detected elsewhere in the Region; however, reports of trace numbers of larvae were common in Amabel, Albemarle and Greenock townships, Owen Sound District, and at widely scattered locations across the southern portion of the Region.

The burlap and pheromone trapping programs that have been conducted in southern Ontario since 1982 were discontinued in 1990. Instead, a new research program in a select group of provincial parks was established in an effort to gain more specific information on larval feeding by gypsy moth and to develop a sampling system to forecast damage. Ten burlap and three pheromone traps were deployed in each of four parks in Southwestern Region (Table 3). The burlap larval traps were examined by park staff four times between 8 June and 19 July. All larvae were counted and then destroyed. The pheromone traps were of the non-saturating bucket type to accommodate the expected large number of moths.

Table 3. Results of the gypsy moth burlap and pheromone trapping programs, defoliation estimates and egg-mass surveys in the Southwestern Region of Ontario in 1990.

Location (Provincial Park)	No. of larvae 1990	Estimated defoliation (%)	No. of male moths caught (1990)	Total no. of egg masses ^a
<u>Chatham District</u>				
Pinery	230	5	493 ^b	0 ^c
Rondeau	7,022	5	864 ^b	190
<u>Simcoe District</u>				
Selkirk	82	5	271	0 ^c
Turkey Point ^d	61	20	1,260	1

^a by the line-search method

^b One pheromone trap was vandalized.

^c egg mass was observed outside of the cruise line

^d sprayed with *Bacillus thuringiensis*

In all parks in which burlap and pheromone trapping were carried out, a line search was completed to detect the presence of gypsy moth egg masses. The greatest egg-mass density was encountered in Rondeau Provincial Park, where 190 egg masses were observed in one line search. A subsequent Modified Kaladar Plot (MKP) sample revealed the presence of 20,200 egg masses/ha. These surveys and general observations made during routine surveys indicate that infestations will continue to expand in Chatham District in 1991, especially at Rondeau and Wheatley provincial parks and in the Moore Township infestation. Population levels at Pinery Provincial Park will probably remain low, but because of the availability of preferred host types (i.e., oak and pine), populations of the gypsy moth may increase rapidly at this location. In Simcoe District, infestations in the two parks surveyed will remain light; however infestations in the remainder of the district will probably continue to expand to the north and east.

In 1990, spray programs were initiated in the Simcoe and Chatham districts to protect foliage from feeding by the gypsy moth. Approximately 2,500 ha of provincially managed woodlots and 4,719 ha of private land were aerially sprayed with *Bacillus thuringiensis* (B.t.), a biological insecticide. As well, a research spray program was carried out in 90 ha of forests treated with two gypsy moth viruses (Gypcheck and Dispar) by the Forest Pest Management Institute of Forestry Canada.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The area of moderate-to-severe defoliation caused by the forest tent caterpillar continued to increase in Owen Sound District. This infestation expanded by 36%, from the 46,290 ha recorded in 1989 to 62,889 ha in 1990. This remains less than 1% of the provincial infestation, which totals 9,480,408 ha (Table 4).

Table 4. Gross area of moderate-to-severe defoliation by the forest tent caterpillar in Owen Sound District and in Ontario from 1986 to 1990.

Year	Gross area of moderate-to-severe defoliation (ha)	
	Owen Sound District	Ontario
1986	0	433,000
1987	0	1,649,977
1988	4,760	3,965,229
1989	46,290	7,915,111
1990	62,889	9,480,408

Moderate-to-severe (50 to 100%) defoliation of sugar maple (*Acer saccharum* Marsh.) and trembling aspen occurred at generally the same locations as in 1989. Damage was concentrated in five distinct large infestations and several smaller pockets (Fig. 3). The largest of these covered more than 25,500 ha and affected sugar maple stands between Wiarton and Lion's Head in Eastnor and Albemarle townships, including most of the Cape Croker Indian Reservation. The next largest expanded over 10,000 ha through most of Holland and Euphrasia townships. Damage remained heavy in the northern and central portions of Keppel Township, with some spread into parts of Amabel Township. Large areas of moderate-to-severe defoliation were also mapped in Sydenham Township, with additional pockets found in St. Vincent, Derby, Sullivan and Bentinck townships. Small numbers of larvae were found at many locations further south in the Region, but not causing any appreciable damage.

Egg-band counts for the purpose of forecasting 1991 infestations were conducted at 15 locations in Owen Sound District (Fig. 4). The results from this survey indicate that infestations will persist in 1991 throughout generally the same area infested in 1990 (Table 5). It should be noted that despite the evidence of the egg-band counts, infestations in Owen Sound District have been present now for 3 years and it is possible that predators, parasites and diseases are building within the forest tent caterpillar population. These factors, with or without adverse weather, may affect population levels.

SOUTHWESTERN REGION

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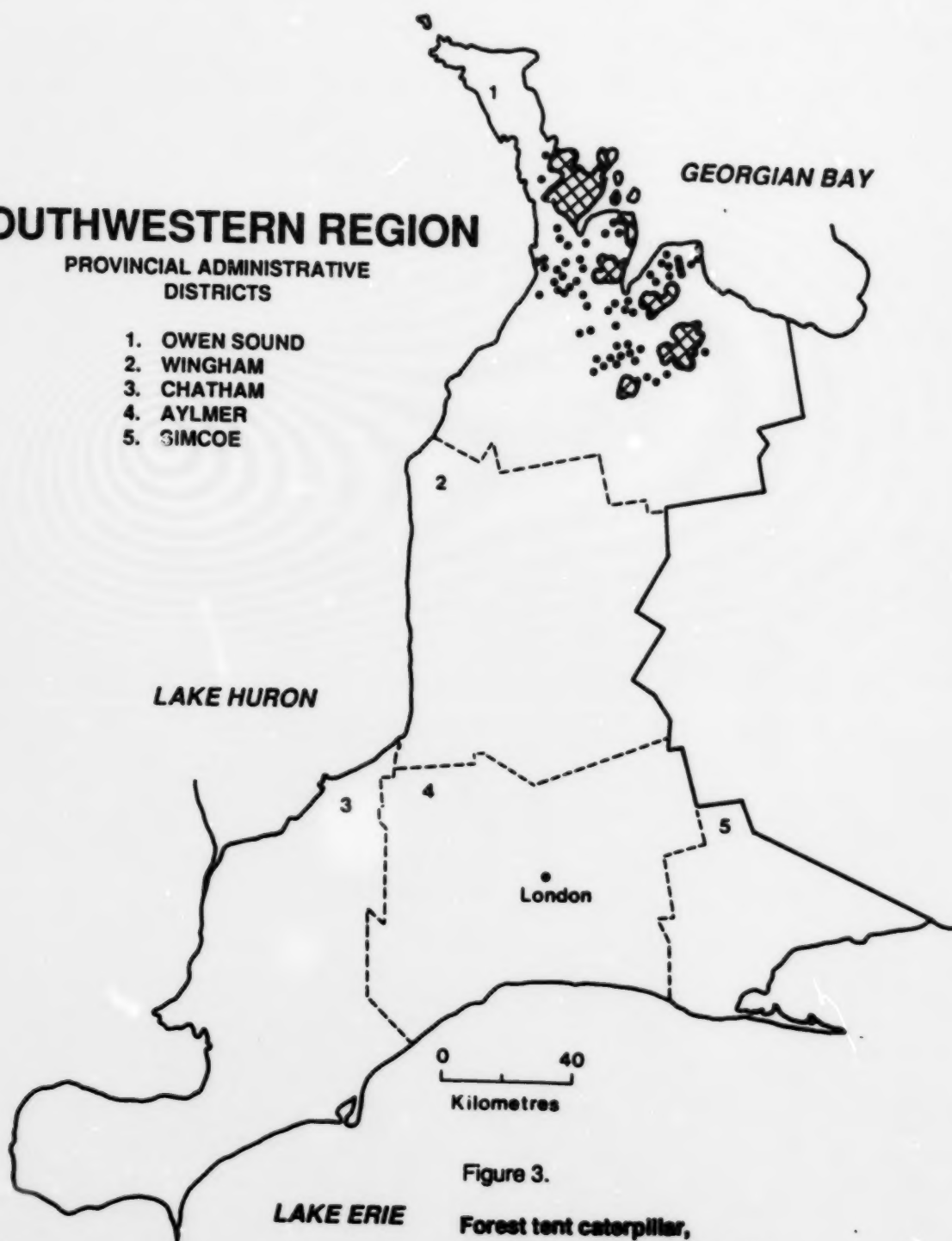


Figure 3.

Forest tent caterpillar,
Malacosoma disstria (Hbn.)

Areas within which moderate-to-severe defoliation
occurred in 1990  or 

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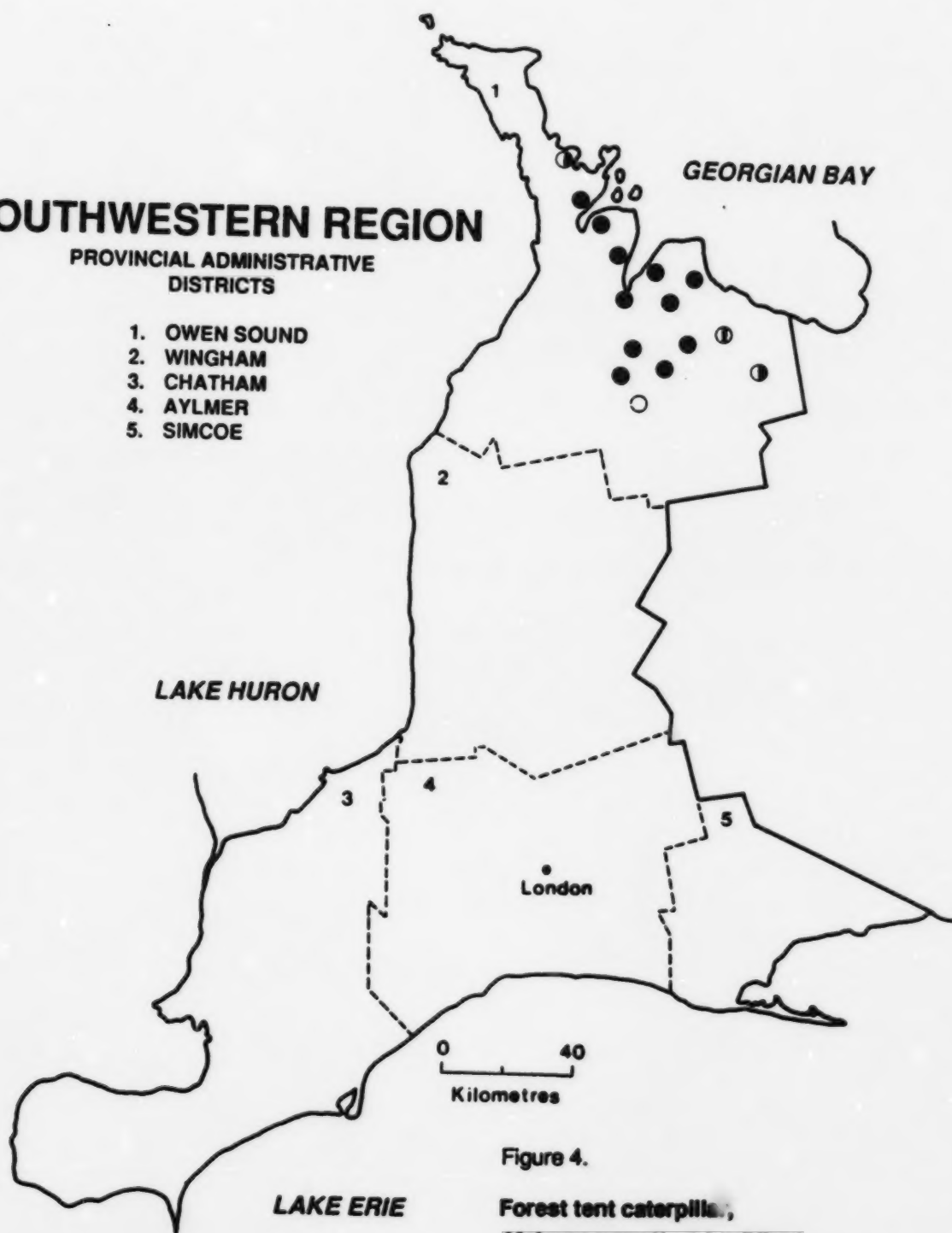


Figure 4.

Forest tent caterpillar,
Malacosoma disstria (Hbn.)

Locations of egg-band sampling and
defoliation forecasts for 1991

severe. ● light. ①
moderate. ② nil. ○

Forest Insect and Disease Survey
Great Lakes Forestry Centre

Table 5. Forest tent caterpillar egg-band counts at 15 locations in the Southwestern Region of Ontario in 1990, with infestation forecasts for 1991 in Owen Sound District.

Location (Twp)	Host ^a	Avg. DBH of trees (cm)	Avg. no. of egg bands per tree	Infestation forecast for 1991
Albemarle	tA	12	100	severe
Bentinck	sM	12	0	nil
Derby	sM	15	19	severe
Eastnor	sM	15	5	moderate
Euphrasia	tA	16	2	light
Holland Con. III	sM	15	17	severe
Holland Con. XI	sM	18	38	severe
Keppel Con. XVI	sM	18	88	severe
Keppel Con. XXII	sM	14	26	severe
Osprey	sM	16	8	moderate
St. Vincent	sM	17	50	severe
Sullivan Con. II	sM	14	46	severe
Sullivan Con. V	sM	18	57	severe
Sydenham Con. IV	sM	14	24	severe
Sydenham Con. VI	sM	15	12	severe

^a tA = trembling aspen, sM = sugar maple

European Pine Sawfly, *Neodiprion sertifer* (Geoff.)

Population levels of the European pine sawfly, which is a serious pest of Scots pine (*Pinus sylvestris* L.), recurred at about the same level as in 1989.

Evaluations in Scots pine Christmas tree plantations of various sizes ranging in height from 1.1 to 1.7 m revealed that 43% of the trees were infested, with an average of 2.4 colonies per tree. Generally, defoliation remained at low levels. The most severely infested plantation was in Charlotteville Township, Simcoe District, where 80% of the trees in a 3-ha area were infested with as many as 12 colonies per tree. At this location, only 10% defoliation resulted because of a careful and timely application of the Sertifer viral insecticide. This insecticide application was done in cooperation with the landowner and Dr. J. Cunningham of the Forest Pest Management Institute of Forestry Canada.

Trace populations were also noted at many scattered locations across the Region in the Aylmer, Chatham and Owen Sound districts.

White Pine Weevil, *Pissodes strobi* (Peck)

The decrease in white pine weevil populations reported in 1989 in Southwestern Region was even more evident in 1990. Observations and evaluations completed in eastern white pine plantations throughout the Wingham, Chatham, Aylmer and Simcoe districts revealed <1% leader mortality at all but one location. Appreciable damage was recorded only in a 2-ha plantation in Charlotteville Township, Simcoe District, where 6.7% of the 2.2-m trees had leader damage.

Minor Insects

Maple Webworm, *Tetralopha asperatella* (Clem.)

Once again, maple webworm population levels were high in the northern part of the Region in 1990. The largest populations were predominantly in the same sugar maple stands previously defoliated by the forest tent caterpillar in Owen Sound District. The webworm was recorded on 100% of the remaining foliage in many stands throughout Eastnor, Albemarle, Keppel, Sydenham, Euphrasia, Holland and Sullivan townships. Smaller populations caused <5% defoliation in sugar maple stands further south in Owen Sound District and in Wawanosh Township, Wingham District.

Table 6. Other forest insects.

Insect	Host(s)	Remarks
<i>Acantholyda erythrocephala</i> (L.) Pine false webworm	ScP	Control operations were necessary because of moderate population levels in parts of a 5-ha Christmas tree plantation in Hepworth Twp, Owen Sound District.
<i>Caliroa cerasi</i> (L.) Pearslug sawfly	Ch, A	Large populations caused 100% foliar browning to host trees in the southern parts of the Chatham, Aylmer and Simcoe districts.
<i>Corthylus punctatissimus</i> (Zimm.) Pitted ambrosia beetle	sH	5% mortality of regeneration was observed in one stand in Saugeen Twp, Owen Sound District, and in West Wawanosh Twp, Wingham District.
<i>Craterocercus fraternalis</i> (Nort.) Oak sawfly	wO	Small numbers of larvae caused <1% defoliation to a single tree in Wheatley Provincial Park, Romney Twp, Chatham District.

(cont'd)

Table 6. Other forest insects (cont'd).

Insect	Host(s)	Remarks
<i>Datana integerrima</i> G. & R. Walnut caterpillar	blW	A marked increase in population levels caused 60 to 100% defoliation on 8-m roadside and forest-edge trees in the Wingham, Aylmer and Simcoe districts.
<i>Epinotia aceriella</i> (Clem.) Maple trumpet skeletonizer	sM	trace numbers in a few stands in the Owen Sound and Wingham districts.
<i>Fenusa pusilla</i> (Lep.) Birch leafminer	wB	A reduced incidence of damage was noted in the Region; however, large populations continued to cause 80 to 100% foliar browning to ornamentals at scattered locations in the Wingham, Chatham, Aylmer and Simcoe districts.
<i>Homadula anisocentra</i> Meyr. Mimosa webworm	hLo	Small populations caused 5% foliar damage to 3.5-m host trees in South Gosfield Twp, Chatham District.
<i>Hyphantria cunea</i> (Drury) Fall webworm	wAs, wE, blW	An increase in populations was recorded in the Region this year. Host trees sustained 20 to 75% defoliation in a 10-ha area in Charlotteville Twp, Simcoe District. Lower levels of defoliation (5 to 50%) were noted in Mersea and Bosanquet twps, Chatham District, and in Minto Twp, Wingham District. Occasional tents were observed at other widely scattered locations in the Region.
<i>Oligonychus ununguis</i> (Jac.) Spruce spider mite	NS, wS	Large populations caused up to 100% foliar discoloration to all but the current year's foliage on open-grown and windbreak trees throughout the Chatham, Aylmer and Simcoe districts.

(cont'd)

Table 6. Other forest insects (concl.).

Insect	Host(s)	Remarks
<i>Plagioder a versicolor a</i> (Laich.) Imported willow leaf beetle	W	100% defoliation on bottomland trees and ornamentals in the southern portion of the Aylmer and Simcoe districts
<i>Podosesia syringae</i> (Harr.) Ash borer	gA	24 of 25 trees were severely infested in an ornamental planting in Townsend Twp, Simcoe District.
<i>Pyrrhalta luteola</i> (M ll.) Elm leaf beetle	wE	40% foliar browning on 9-m trees along a windbreak in the town of Aylmer, Malahide Twp, Aylmer District.

TREE DISEASES

Major Diseases

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schäpfer-Bernhard

Surveys for the presence of this disease were conducted at 12 locations across the Region in red pine (*Pinus resinosa* Ait.) and Scots pine plantations (Fig. 5). Once again, there was no evidence of the canker at any of the areas surveyed, nor has there been any evidence of this disease in the more than 299 pine plantations that have been examined in the Region since specific surveys for this disease began in 1978. Over the years, aerial reconnaissance has revealed various other pest problems, such as juglone toxicity, Armillaria root rot (*Armillaria ostoyae* [Romagn.] Herink.), root-collar weevils, porcupine damage, lightning strikes, bark beetle damage, drought and tip blight (*Sphaeropsis sapinea* [Fr.] Dyko & B. Sutton); each has caused or contributed to pine mortality.

Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

This fungus continues to be a cause of significant twig mortality and dieback in ornamental plantings of exotic and native pines. Damage was noted this year in Christmas tree plantations in the southern portion of the Region.

Ornamental and roadside plantings of Austrian pine (*Pinus nigra* Arnold) sustained extensive branch and occasional whole-tree mortality in some towns and cities in the Chatham, Aylmer and Simcoe districts. This disease was particularly virulent in a 1-ha Scots pine Christmas tree plantation in North Walsingham Township, Simcoe District. Infection levels were highest on the 1.1-m crop trees closest to a mature red pine and Scots pine windbreak. Shoot damage averaged 60% on 70% of the trees; however, infections diminished in intensity about 50 m from the mature windbreak trees. Infection levels in the center of the plantation were considerably lower; 2% of the new shoots were killed on 5% of the trees.

Table 7. Other forest diseases.

Organism	Host(s)	Remarks
<i>Apiognomonis quercina</i> (Kleb.) Höhnelt Anthracnose	WO	35 to 90% foliar damage recorded in two separate stands in South Walsingham Twp, Simcoe District, and Bosanquet Twp, Chatham District

(cont'd)

SOUTHWESTERN REGION

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1. OWEN SOUND
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5. SIMCOE

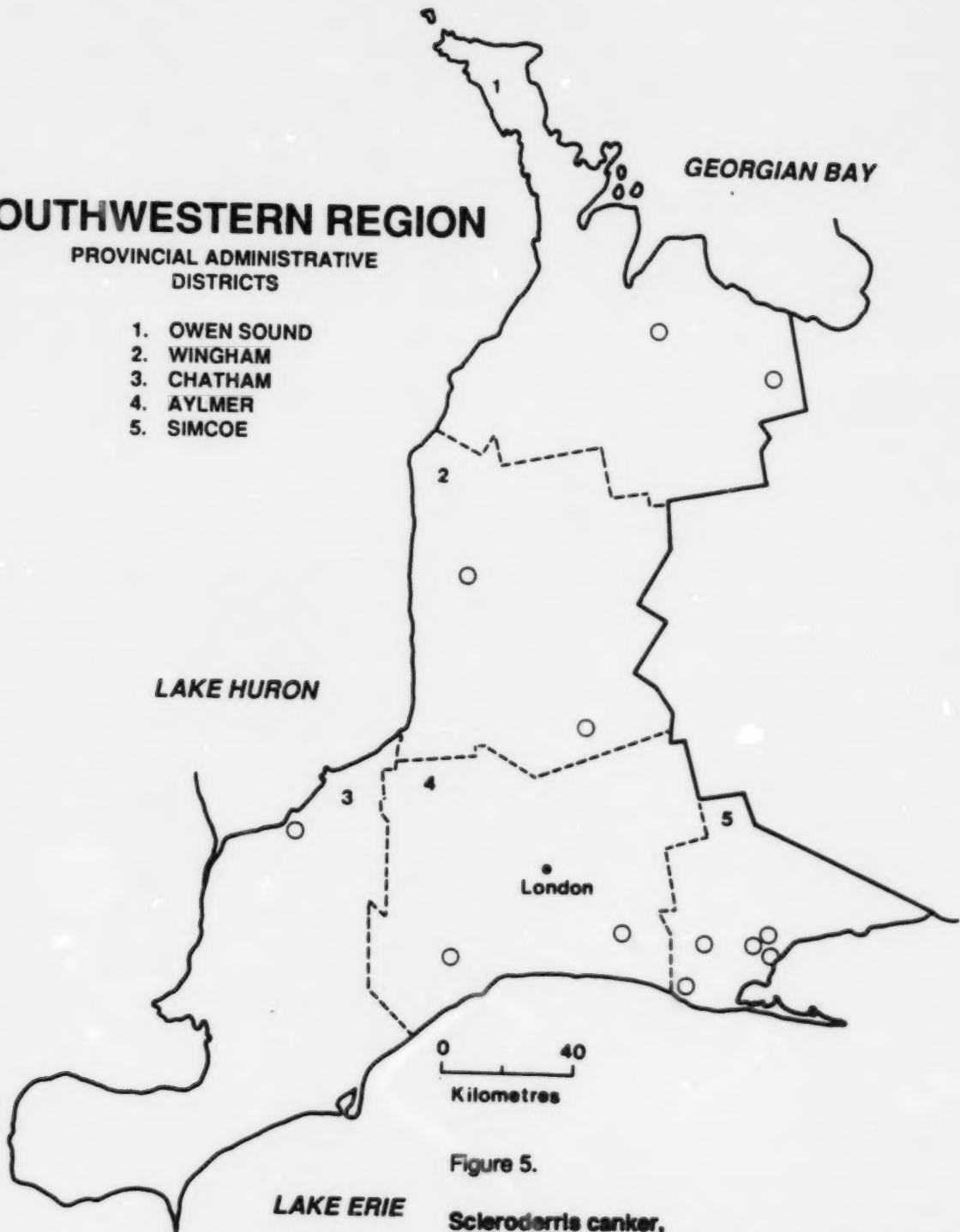


Figure 5.

Scleroderris canker,

***Ascochyx abietina* (Lagerb.) Schläpfer-Bernhard**

Locations at which pine plantations were
surveyed for this disease in 1990.

negative results. O

Table 7. Other forest diseases (cont'd).

Organism	Host(s)	Remarks
<i>Apiognomonia veneta</i> (Sacc. & Speng.) Hvhnel Anthracnose	Sy	Infection levels of up to 100% occurred on ornamental and bottomland sycamore (<i>Platanus</i> spp.) in the Simcoe, Aylmer and Chatham districts.
<i>Armillaria</i> sp. Armillaria root rot	rO, wO	Single-tree mortality was recorded in Wheatley Provincial Park, Romney Twp, Chatham District, and in South Walsingham Twp, Simcoe District.
<i>Asteroma microspermum</i> (Peck) B. Sutton Leafspot	wB	80% leaf infection on a 5-m ornamental tree in Walpole Twp, Simcoe District
<i>Ceratocystis ulmi</i> (Buism.) C. Moreau Dutch elm disease	wE	4% mortality to 20- to 30-cm roadside trees in Walpole Twp, Simcoe District
<i>Cryphonectria parasitica</i> (Murrill) Barr Chestnut blight	Che	A single tree was severely cankered, causing 10% branch mortality, in Bayham Twp, Aylmer District.
<i>Discula campestris</i> (Pass.) v. Arx Anthracnose	sM	Leaf damage of 25 to 100% occurred on 50% of the roadside and understory regeneration trees in one location in each of Stanley and North Easthope twps, Wingham District.
<i>Discula umbrinella</i> (Berk. & R. Br.) Morelet Anthracnose	sM, Be	60-100% leaf infection on wind-damaged foliage in woodlots and on open-grown roadside trees in Chatham Twp, Chatham District, and in Stanley and Goderich twps, Wingham District
<i>Guignardia aesculi</i> (Peck) Stewart Leaf blotch	hChe	Lower levels of infection were generally experienced in the Region this year.
<i>Gymnosporangium globosum</i> Farlow Globose gall rust	rJ	light (<5%) branch-tip mortality on 3-m trees in the Aylmer and Simcoe districts

(cont'd)

Table 7. Other forest diseases (concl.).

Organism	Host(s)	Remarks
<i>Marssonina brunnea</i> (Ell. & Ev.) Magnus Marssonina leaf spot	tA, cPo	Very heavy infections caused premature leaf drop throughout southern Chatham, Aylmer and Simcoe districts. Defoliation ranged from 45 to 100% on all windbreaks and on open-grown trees.
<i>Marssonina castagnei</i> (Desm. & Mont.) siPo Magnus Marssonina leaf spot		Host trees growing in small pockets of up to 0.5 ha in area sustained 80% defoliation in the Wingham, Chatham, Aylmer and Simcoe districts.
<i>Marssonina juglandis</i> (Lib.) Magnus Hickory leaf spot	bWa, sHi	Trees in the St. Williams seedling seed orchard sustained 15% foliar damage. Elsewhere, foliar damage ranged from 10 to 90% on open-grown and planted black walnut (<i>Juglans nigra</i> L.) throughout the Simcoe and Aylmer districts. Defoliation averaged 80% on hickory (<i>Carya ovata</i> [Mill.] K. Koch) in Essex and Lambton counties, Chatham District.
<i>Monostichella robergei</i> (Desm.) Hvhnel Leaf spot	hH	Foliar damage averaged 20% on all host trees in Rondeau Prov. Pk, Harwick Twp, and 80% defoliation was observed in Pelee Nat'l Park, Mersea Twp, Chatham District.
<i>Rhytisma acerinum</i> (Pers.) Fr. Tar spot	sM, siM	light infection on 100% of the leaves on a few trees in the Parkhill Conserv. Area, McGillivray Twp, Aylmer District
<i>Verticillium albo-atrum</i> Reinke & Berth. Verticillium wilt	Ca	Single-tree infections caused 50% crown dieback on ornamentals in Delhi and Simcoe twps, Simcoe District.

ABIOTIC DAMAGE

Cold Damage

Severe damage to hardwood foliage was associated with cold temperatures in early May throughout the Region adjacent to the shores of Lakes Huron and Lake Erie (Fig. 6).

Temperatures dipped as much as 6.30C below the seasonal normal on 11 and 12 May, reaching 0.0 and -0.50C at widely scattered locations in the Region (Fig. 7). Because of the proximity to the Great Lakes, actual air temperatures in the tree crowns may have been much cooler than those recorded at the weather stations. The most severe damage occurred to trees in small patches of up to 0.5 ha in size that were exposed to northwest winds. Damage was in the form of shriveled leaves and foliar browning that caused up to 100% defoliation and was primarily located on the western side or in the upper exposed portion of the crowns of affected trees. Damage was recorded in woodlots ranging in size from 1 to 20 ha containing sugar maple and silver maple (*A. saccharinum* L.) throughout Essex and Kent counties, Chatham District, and in the south-central portion of Owen Sound District. Woodlots composed of white ash (*Fraxinus americana* L.), beech (*Fagus grandifolia* Ehrh.) and maple in the Bayfield and Goderich areas of Wingham District were also injured. Damage was rarely found more than 15 km from the lake shores. In the Aylmer and Simcoe districts, damage was less obvious and was only recorded on the occasional exposed white oak (*Q. alba* L.), red maple (*A. rubrum* L.) or silver maple. Foliar damage ranged from 25 to 100% and averaged 60% on these trees.

Frost caused light damage to the occasional Colorado blue spruce (*Picea pungens* Engelm.) and white spruce in the city of Chatham, Chatham District, where 20% of the current year's foliage was damaged.

Ice Damage

In late February and early March 1990, a series of storms coated branches with ice, causing extensive breakage on willow (*Salix* spp.) and aspen (*Populus* spp.) growing along the northern shore of Lake Erie (Fig. 8).

Large limbs and branches were broken in 10 to 50% of the crowns of mature trees south of Ridgetown in Howard and Oxford townships, Chatham District. Similar damage was evident from the Port Stanley area, Southwold Township, Aylmer District, east along the northern shore of Lake Erie and throughout the entire Simcoe District. The damage was confined to a 2 or 3 km band along the shoreline and often did not extend more than a few hundred metres from the shore.

Wind Damage

On two widely separated occasions in 1990, high winds battered woodlots and open-grown trees, causing extensive damage in Southwestern Region.

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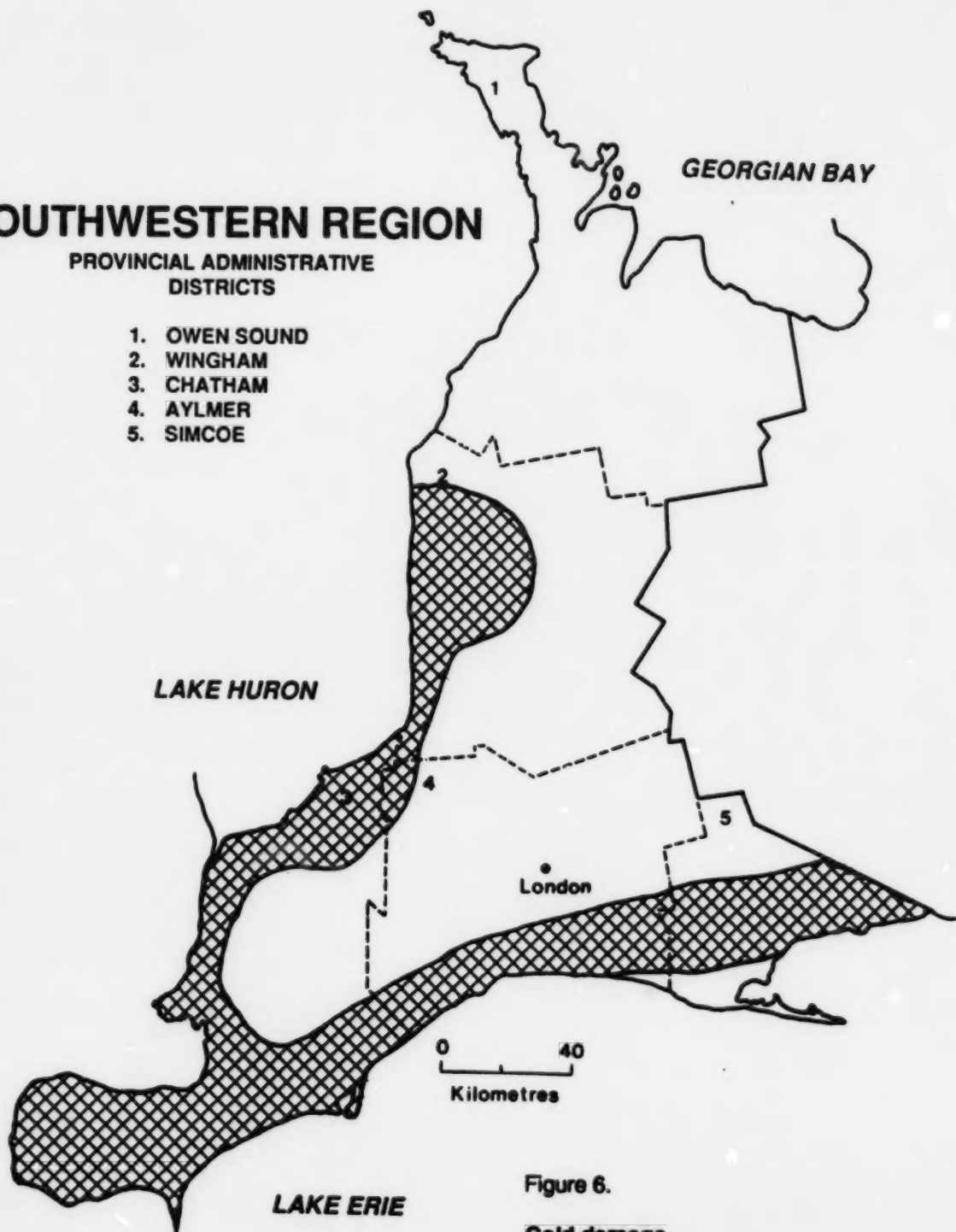


Figure 6.

Cold damage

Area within which cold
damage occurred in 1990. . 

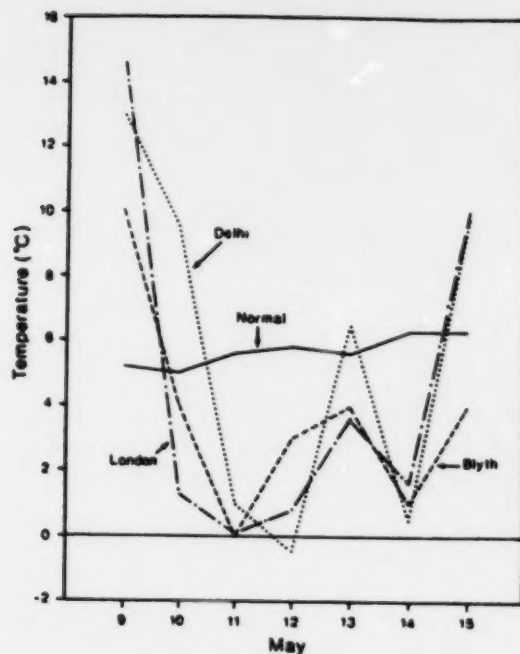


Figure 7. Daily minimum temperatures at three locations and the seasonal normals for London from 9 to 15 May 1990 in the Southwestern Region of Ontario.

Two violent thunderstorms on 27 and 28 August caused scattered damage to individual forest, woodlot and ornamental trees in the Wingham, Chatham, Aylmer and Simcoe districts (Fig. 9). The first storm had wind gusts up to 90 km/hr, delivered 40 mm of rain, and was accompanied by severe lightning. The storm resulted in broken, blown-down and uprooted trees throughout an area north of Sarnia along Lake Huron, Chatham District, eastward through the northern and western portions of Aylmer District into the greater London area, and north to encompass south-central Wingham District.

A second, more-severe storm occurred less than 18 hours later, delivering an additional 31 mm of rain and accompanied by wind gusts of up to 200 km/hr and by several tornadoes. Damaged timber was observed throughout the southeastern part of Wingham District and eastern side of Chatham District, encompassing all of Aylmer District, and the western portion of Simcoe District as far east as the town of Delhi. The most severe damage was concentrated in south-central Aylmer District, where the tornadoes caused large patches of uprooted and broken trees (see Frontispiece). The damage was mapped in a band 16 km long and up to 1.5 km wide from Komoka, Lobo Township, south through Delaware Township, and ending north of Port Stanley, Southwold Township (Fig. 9). Deciduous and coniferous trees in woodlots or forested areas were destroyed in pockets ranging in size from 0.5 to 170 ha and the total area damaged by tornadoes was 421 ha.

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Figure 8.

Ice damage

Area within which ice
damage occurred in 1990. .

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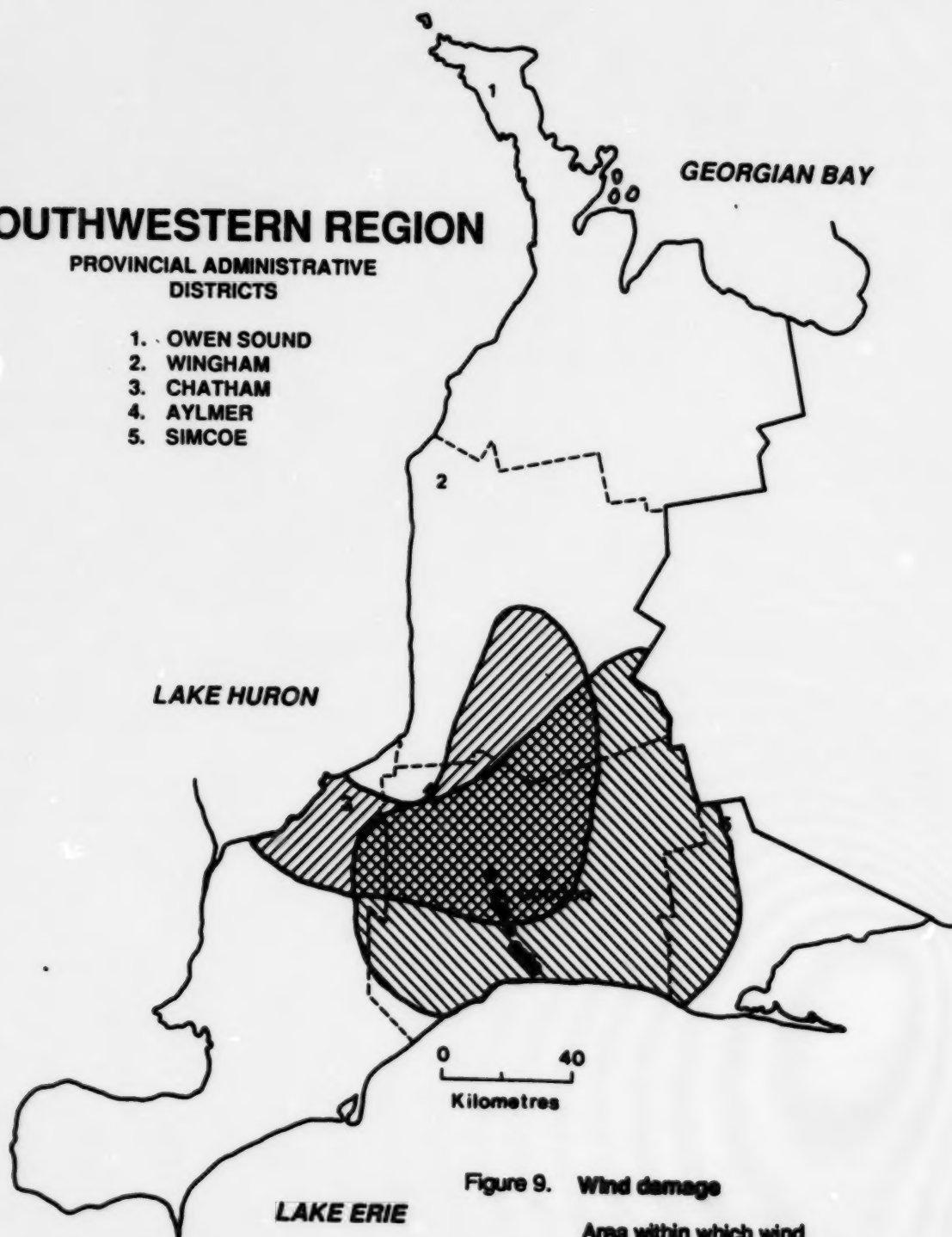


Figure 9. Wind damage

Area within which wind
damage occurred in 1990.

- Tornado... 
Storm 1... 
Storm 2... 

In addition, repeated high winds in early May caused scattered leaf damage and occasional breakage to silver maple and sugar maple in southern Wingham and northern Aylmer and Simcoe districts. One assessment revealed foliar damage in the form of up to 71% torn and shredded leaves on 100% of the roadside and exposed woodlot trees in North Easthope Township, Wingham District. An assessment in South Norwich Township, Simcoe District, found that all roadside maples had sustained 50% foliar damage, typical of observations in the remainder of the affected area.

Table 8. Other abiotic conditions.

Damage	Host	Remarks
Leaf Scorch	SM	75-100% of the foliage affected on open-growing roadside and woodlot trees at numerous locations in the Owen Sound and Wingham districts
Salt Damage	rP	A 0.2-ha plantation of 9.5-m red pine sustained 60 to 95% foliar browning and light branch mortality in the town of Simcoe, Simcoe District.

FOREST HEALTH

Oak Health

Three oak health plots in Southwestern Region were assessed for the 14th consecutive year and tree conditions for the past 4 years are summarized in Table 9. A standard classification system has been used to record the current and cumulative dieback levels in each crown. The first two classification categories (0 and 1) are considered to represent light (0-20%) dieback and may be normal in forest stands.

In Chatham District, the plot in Bosanquet Township revealed small increases in the extent of crown damage. Two additional trees died, one as a result of competition from surrounding vegetation and the other for no apparent reason, although it was infested with carpenter ants (*Campanotus* sp.). This brought total mortality to 14 trees. Three trees moved into each of the second and fourth cumulative dieback classes. In Simcoe District, the oak plot in Charlotteville Township showed an increase in decline once again; 12 more trees were added to the 21-40% cumulative crown dieback class, and seven more trees were added to the 41-60% class. All trees in the plot were once again defoliated by the gypsy moth, with foliar damage ranging from 2 to 50%. Small increases in cumulative crown dieback and in mortality were again noted in the South Walsingham Township oak plot, where defoliation by the gypsy moth averaged 22% and was as high as 95% on some trees.

The increases in crown deterioration recorded in all the plots may be a result of drought conditions that were prevalent in the Region during the 1987 through 1989 growing seasons. Other factors that may have affected individual trees were gypsy moth feeding and damage by wind, ice and frost.

Table 9. Summary of oak health at three locations in the Southwestern Region of Ontario from 1987 to 1990.

Location (Twp)	Avg. DBH ^a (cm)	No. of trees exam- ined	Year	Current dieback ^b					Cumulative dieback ^b					Trees blown down or cut		
				0	1	2	3	4	5	0	1	2	3		4	5
				No. of trees												
Chatham District																
Bosanquet	29	100	1987	92	1	0	0	1	5	75	14	0	1	4	5	0
			1988	88	5	0	0	1	2	74	12	0	2	4	6	1
			1989	89	5	1	0	0	5	50	29	7	1	1	11	1
			1990	79	4	3	0	0	2	41	31	10	0	4	13	1
Simcoe District																
Charlotte- ville	32	101	1987	94	5	0	0	0	2	35	57	4	2	1	2	0
			1988	85	13	1	0	0	0	42	47	8	1	1	2	0
			1989	14	71	10	1	0	3	3	54	37	1	1	3	2
			1990	11	76	8	0	0	1	1	37	49	8	0	4	2
South Walsingham	22	110	1987	98	1	0	0	0	11	81	17	1	0	0	11	0
			1988	96	1	1	0	1	0	82	13	3	0	1	11	0
			1989	71	20	1	0	6	1	54	29	9	0	6	11	1
			1990	58	31	3	0	4	2	34	40	14	2	6	13	1

^a from 1977 measurements

^b 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-100%, 5 = dead tree

Maple Health

In 1987, 10 maple health plots were established in woodlots in Southwestern Region as part of Forestry Canada's response to a growing concern about the condition of maple in the province. Since then, the program has expanded to include an additional six urban plots and six rural plots, of which 10 were established in 1989 and two were added in 1990 in Owen Sound District. An additional five woodlot plots were established in stands in which control operations against the forest tent caterpillar had taken place in 1989 (in both 1989 and 1990 in Owen Sound District).

In the 10 woodlot study plots (Table 10), no significant change has occurred in the current or cumulative crown conditions. The only changes worth noting in 1990 were in Plympton Township, Chatham District, where one

Table 10. Summary of maple health at 15 woodlot locations in the Southwestern Region of Ontario from 1987 to 1990 (25 maple trees examined at each location).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback ^a							Cumulative dieback ^a							Trees blown down or cut
				0	1	2	3	4	5	0	1	2	3	4	5			
				Number of trees														
<u>Aylmer District</u>																		
Malahide	35.3	22	1987	25	0	0	0	0	0	25	0	0	0	0	0	0	0	
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1989	24	1	0	0	0	0	24	1	0	0	0	0	0		
			1990	22	3	0	0	0	0	22	3	0	0	0	0	0		
West Oxford	27.1	21	1987	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1989	23	1	0	0	0	1	23	1	0	0	0	1	0		
			1990	24	0	0	0	0	0	24	0	0	0	0	1	0		
<u>Chatham District</u>																		
Plympton	29.3	22	1987	25	0	0	0	0	0	24	1	0	0	0	0	0		
			1988	24	1	0	0	0	0	23	2	0	0	0	0	0		
			1989	23	1	1	0	0	0	23	0	1	1	0	0	0		
			1990	22	1	1	0	0	1	21	1	1	0	1	0	1		
Warwick	31.3	27	1987	24	1	0	0	0	0	24	1	0	0	0	0	0		
			1988	22	1	0	0	1	0	22	1	0	0	1	0	1		
			1989	21	1	0	1	0	1	21	1	0	0	1	1	1		
			1990	22	0	0	0	0	1	21	1	0	0	0	2	1		
<u>Owen Sound District</u>																		
Derby	31.6	24	1987	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1989	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1990	25	0	0	0	0	0	25	0	0	0	0	0	0		
Sullivan	42.2	26	1987	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1988	24	1	0	0	0	0	24	1	0	0	0	0	0		
			1989	25	0	0	0	0	0	24	1	0	0	0	0	0		
			1990	24	1	0	0	0	0	24	1	0	0	0	0	0		
Keppel Conc. I ^c	27.0	20	1990	25	0	0	0	0	0	25	0	0	0	0	0	0		
Keppel Conc. XVI ^b	26.7	20	1990	23	2	0	0	0	0	23	2	0	0	0	0	0		
Keppel Conc. XXI ^c	32.1	24	1990	25	0	0	0	0	0	25	0	0	0	0	0	0		
Keppel Conc. XXI ^c	38.3	22	1990	25	0	0	0	0	0	25	0	0	0	0	0	0		
Keppel Conc. XXII ^b	33.1	21	1990	24	0	1	0	0	0	24	0	1	0	0	0	0		
<u>Simcoe District</u>																		
Houghton	33.3	24	1987	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1989	25	0	0	0	0	0	25	0	0	0	0	0	0		
			1990	25	0	0	0	0	0	25	0	0	0	0	0	0		

(cont'd)

Table 10. Summary of maple health at 15 woodlot locations in the Southwestern Region of Ontario from 1987 to 1990 (25 maple trees examined at each location) (concl.).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback ^a						Cumulative dieback ^a						Trees blown down or cut
				0	1	2	3	4	5	0	1	2	3	4	5	
				Number of trees												
<u>Simcoe District (concl.)</u>																
North Norwich	31.0	21	1987	25	0	0	0	0	0	25	0	0	0	0	0	0
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0
			1989	25	0	0	0	0	0	25	0	0	0	0	0	0
			1990	25	0	0	0	0	0	25	0	0	0	0	0	0
<u>Wingham District</u>																
Morris	29.5	21	1987	25	0	0	0	0	0	25	0	0	0	0	0	0
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0
			1989	25	0	0	0	0	0	24	1	0	0	0	0	0
			1990	23	2	0	0	0	0	23	2	0	0	0	0	0
West Wawanosh	30.3	21	1987	25	0	0	0	0	0	25	0	0	0	0	0	0
			1988	25	0	0	0	0	0	25	0	0	0	0	0	0
			1989	24	1	0	0	0	0	24	1	0	0	0	0	0
			1990	24	1	0	0	0	0	23	2	0	0	0	0	0

^a 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-100%, 5 = dead tree

^b sprayed with B.t. against the forest tent caterpillar in 1989.

^c sprayed with B.t. against the forest tent caterpillar in 1989 and 1990.

tree was snapped off by the wind and another sustained >60% dieback from a *Nectria* stem canker (*Nectria* sp.) infection. In the Warwick Township plot, Chatham District, one tree died for reasons that could not be determined. Otherwise, all remaining woodlot plots, including the five newly established plots, were in good condition.

The stresses and site disturbances under which urban and rural roadside trees grow are different from those experienced by woodlot trees, and this difference is reflected in the current and cumulative crown conditions. Table 11 summarizes crown conditions for these urban and rural trees. Examination of this data reveals that seven severely declining trees on four plots were cut and removed by maintenance crews. The most serious damage was recorded in the Wingham District plots, where maple growing in rural situations experienced severe dieback. In 1989, 29% of the trees in the plots in Wingham District had more than 20% crown dieback, whereas 40% of trees were in this category in 1990, with 7% of those trees dead or cut. The only other notable changes occurred in the Woodstock plot, in which two additional trees were removed because of their poor crown condition.

Table 11. Summary of maple health at 12 urban and rural locations in the Southwestern Region of Ontario in 1989 and 1990 (25 maple trees examined at each location).

Location	Plot type ^a	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback ^b										Accumulative dieback ^b					Trees blown down or cut
					number of trees															
					0	1	2	3	4	5	0	1	2	3	4	5				
<u>Aylmer District</u>																				
<u>Bayham Twp</u>																				
	R	85.9	20	1989	23	2	0	0	0	0	0	23	2	0	0	0	0	0		0
				1990	23	2	0	0	0	0	0	22	2	1	0	0	0	0		0
<u>Strathroy</u>																				
	U	82.5	24	1989	24	1	0	0	0	0	0	21	4	0	0	0	0	0		0
				1990	25	0	0	0	0	0	0	22	3	0	0	0	0	0		0
<u>Woodstock</u>																				
	U	63.4	23	1989	22	1	1	0	0	1	20	2	2	0	0	1	0	0		0
				1990	19	3	0	0	0	2	19	1	2	0	0	1	2			2
<u>Simcoe District</u>																				
<u>Norwich</u>																				
	U	60.8	16	1989	18	3	4	0	0	0	0	17	4	3	0	1	0	0		0
				1990	17	6	2	0	0	0	0	15	6	3	0	1	0	0		0
<u>South Walsingham Twp</u>																				
	R	62.8	20	1989	20	5	0	0	0	0	0	18	4	2	1	0	0	0		0
				1990	16	8	0	1	0	0	0	15	6	3	0	1	0	0		0
<u>Windham Twp</u>																				
	R	81.9	23	1989	23	2	0	0	0	0	0	22	3	0	0	0	0	0		0
				1990	22	3	0	0	0	0	0	21	4	0	0	0	0	0		0
<u>Owen Sound District</u>																				
<u>Owen Sound</u>																				
	U	91.0	26	1990	21	4	0	0	0	0	0	21	3	1	0	0	0	0		0
	R	84.4	20	1990	11	12	2	0	0	0	0	9	11	5	0	0	0	0		0
<u>Wingham District</u>																				
<u>Blyth</u>																				
	U	74.3	23	1989	19	3	3	0	0	0	0	14	5	4	2	0	0	0		0
				1990	17	7	0	0	0	1	14	4	5	1	2	0	0	1		1
<u>Goderich Twp</u>																				
	R	72.4	19	1989	13	7	4	1	0	0	0	9	4	6	4	2	0	0		0
				1990	6	9	5	1	0	4	6	5	5	1	4	1	3	0		3
<u>North Easthope Twp</u>																				
	R	69.2	18	1989	4	17	3	1	0	0	4	12	5	2	2	0	0	0		0
				1990	4	10	8	2	0	1	2	6	8	4	4	1	0	0		0
<u>Wingham</u>																				
	U	68.0	21	1989	23	0	2	0	0	0	0	20	3	0	1	1	0	0		0
				1990	21	2	1	0	0	1	20	3	0	0	1	0	1	0		1

^a R = Rural, U = Urban

^b 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-100%, 5 = dead tree

North American Maple Project

In 1990, the third year of a 3-year cooperative study between Forestry Canada, the United States Forest Service and private landowners, the Forest Insect and Disease Survey Unit once again evaluated the condition of sugar maple in sugarbushes and undisturbed woodlots at seven locations in Southwestern Region. Observations at six of these plots showed a slight recovery in crown condition; 95% of the trees evaluated had <15% crown dieback in 1989, and 98% of the trees were in this category in 1990 (Table 12). The only exception to this was in the remaining plot in Townsend Township, Simcoe District, where 16% of the mature to overmature trees had dieback levels ranging from 16 to 85%.

Acid Rain National Early Warning System (ARNEWS)

Since their establishment, annual assessments have been conducted in three ARNEWS plots in the Region. Branch, crown and tree conditions have been monitored and the presence of insect, disease or abiotic damage has been recorded. Table 13 summarizes the cumulative tree condition for all years since the establishment of each plot.

The most significant damage recorded on plot trees in 1990 were the maple webworm, causing <5% defoliation in the West Wawanosh Township plot, Wingham District; trace defoliation by the gypsy moth in the South Walsingham Township plot, Simcoe District; and light levels of wind damage in the Howard Township plot, Chatham District. The elm casebearer (*Coleophora limosipinnella* Dup.) also caused 60% defoliation to understory elm in the Chatham District plot. No symptoms of acid rain damage have been observed in any of the plots since their establishment.

SPECIAL SURVEYS

Forest Tree Nursery Report

A number of problems were encountered during 10 visits made to the St. Williams Forest Tree Nursery during the 1990 field season.

Potentially the most serious pest that the nursery staff had to deal with was the gypsy moth. Defoliation was kept to a minimum on nursery stock and windbreak trees by aerial application of the biological insecticide B.t. In black walnut seedlings, hickory leaf-spot disease caused up to 100% defoliation on some seedlings in bed D8, but averaged 65% foliar infection. Marssonina leaf spot (*Marssonina* sp.) caused very heavy (80%) leaf infection in the poplar cutting bed C12. In the eastern white pine seedling seed orchard and in compartment A17, an adelgid (*Pineus* sp.) lightly infested approximately 10 to 20% of the trees. Frost heaving caused low levels of white spruce seedling mortality in compartments C6 and E6, and Norway spruce mortality in compartment A7. Populations of the eastern spruce gall adelgid and cedar leafminer were recorded at endemic levels, whereas the larch casebearer once again caused up to 100% defoliation of European larch windbreaks and shelterbelts.

Table 12. Summary of the crown condition of sugar maple at seven North American Maple Project plots from 1988 to 1990 for the South-western Region of Ontario.

Location (Twp)	Avg. DBH (cm)	Year	No. of trees examined	Total dead crown (%)											Trees blown down	
				0	1-5	6-15	16-25	26-35	36-45	46-55	56-65	66-75	76-85	86-95		96-100
Number of trees																
Trees dead or cut																
Aylmer District																
Bayham ^b																
	73.5	1988	39	13	22	1	1	1	0	0	0	0	0	1	0	0
		1989	39	18	18	0	2	1	0	0	0	0	0	0	0	0
		1990	39	3	33	2	1	0	0	0	0	0	0	0	0	1
Blandford ^a																
	29.6	1988	42	36	6	0	0	0	0	0	0	0	0	0	0	0
		1989	42	21	21	0	0	0	0	0	0	0	0	0	0	0
		1990	42	0	41	1	0	0	0	0	0	0	0	0	0	0
Chatham District																
Warwick ^a																
	26.5	1988	48	38	9	0	1	0	0	0	0	0	0	0	0	0
		1989	47	20	27	0	0	0	0	0	0	0	0	0	0	0
		1990	47	3	41	3	0	0	0	0	0	0	0	0	1	0
Owen Sound District																
Saugeen ^b																
	30.8	1988	38	12	24	1	1	0	0	0	0	0	0	0	0	0
		1989	38	5	26	4	2	1	0	0	0	0	0	0	0	0
		1990	38	0	30	7	0	0	1	0	0	0	0	0	0	0
Simcoe District																
Townsend ^b																
	41.1	1988	32	15	8	3	2	2	1	0	1	0	0	0	0	0
		1989	32	14	9	3	1	2	1	0	1	0	1	0	0	0
		1990	32	4	16	7	1	0	1	1	1	0	1	0	0	0
Wingham District																
Goderich ^b																
	32.3	1988	62	23	30	6	1	0	0	1	0	0	0	0	1	0
		1989	60	17	36	3	2	2	0	0	0	0	0	0	0	0
		1990	60	0	54	3	2	0	0	0	1	0	0	0	0	1
West Wawanosh ^a																
	29.9	1988	36	14	20	2	0	0	0	0	0	0	0	0	0	0
		1989	36	9	26	1	0	0	0	0	0	0	0	0	0	0
		1990	36	1	32	3	0	0	0	0	0	0	0	0	0	0

^a undisturbed woodlot

^b trees currently tapped for maple syrup

Table 13. Summary of hardwood health at three Acid Rain National Early Warning System plots established in the Southwestern Region of Ontario.

Location (Twp)	Tree species	No. of trees examined	Avg. DBH (cm)	Year	Tree crown condition ^a								
					1	2	3	4	5	6	7	8	9
<u>Chatham District</u>													
Howard	sM	9	36.3	1985	3	0	0	6	0	0	0	0	0
				1986	3	0	0	6	0	0	0	0	0
				1987	3	0	0	6	0	0	0	0	0
				1988	2	0	5	2	0	0	0	0	0
				1989	2	0	4	3	0	0	0	0	0
				1990	1	0	6	2	0	0	0	0	0
<u>Simcoe District</u>													
South Walsingham	Oak	16	27.8	1986	1	0	4	7	4	0	0	0	0
				1987	0	0	2	12	2	0	0	0	0
				1988	1	0	3	11	1	0	0	0	0
				1989	0	0	3	13	0	0	0	0	0
				1990	2	0	5	8	1	0	0	0	0
<u>Wingham District</u>													
West Wawanosh	sM	15	41.1	1985	7	0	0	7	0	0	0	0	1
				1986	7	0	0	7	0	0	0	0	1
				1987	6	0	0	7	0	1	0	0	1
				1988	6	0	4	3	0	0	1	0	1
				1989	5	1	3	4	0	0	0	1	1
				1990	2	0	7	4	0	0	0	0	2

^a Crown classes: 1 = normal, healthy tree; 2 = foliage thin, off-color, particularly in upper crown, no bare twigs or branches; 3 = dead twigs present but no dead branches (dead twigs occur at the ends of branches, usually in the top of the crown and for a distance of about 0.5 to 1.0 m from the edge of the crown); 4 = dead branches present on up to 25% of the crown; 5 = dead branches present on up to 50% of the crown; 6 = >50% of the crown dead but some living branches still present on the tree; 7 = >50% of the crown dead, no living branches present on the tree; 8 = new dead tree; 9 = old dead or missing tree.

Climatic Data

Forest insects and diseases can be greatly influenced by prevailing weather conditions during times critical to their development. Forest health is also affected to a large degree by extremes in weather conditions. Base-line weather data (Table 14) are included in this report and may help in explaining variations in pest populations and abiotic damage. The data were supplied by the Atmospheric Environment Service of Environment Canada.

Table 14. Monthly mean temperatures and total precipitation at three locations in the Southwestern Region of Ontario in 1990^a, and 30-year normals.

Location	Month	Mean temp. (°C)		Deviation from normal		Total precip. (mm)		Deviation from normal	
		Normal ^a	Actual	(°C)	(%)	Normal ^a	Actual	(mm)	(%)
<u>Aylmer District</u>									
London	Jan.	-6.6	-1.4	+5.2	+79	75.2	66.4	-8.8	-12
	Feb.	-6.1	-3.2	+2.9	+47	60.5	133.0	+72.5	+120
	Mar.	-0.9	1.8	+2.7	+300	75.1	59.3	-15.8	-21
	Apr.	6.4	8.1	+1.7	+26	81.2	67.6	-13.6	-17
	May	12.4	11.5	-0.9	-7	66.9	125.8	+58.9	+88
	June	17.9	17.7	-0.2	-1	73.6	97.8	+24.2	+33
	July	20.3	20.0	-0.3	-1	72.4	144.0	+71.6	+105
	Aug.	19.5	19.5	0.0	0	80.3	124.4	+44.1	+55
	Sept.	15.4	15.0	-0.4	-3	78.6	118.7	+40.1	+50
	Oct.	9.4	9.1	-0.3	-3	73.4	108.9	+35.5	+48
	Nov.	3.1	4.8	+1.7	+55	84.7	105.4	+20.7	+24
	Dec.	-3.5	-1.4	+2.1	+60	87.5	151.4	+64.1	+73
<u>Simcoe District</u>									
Delhi	Jan.	-6.0	-0.6	+5.4	+90	68.8	81.6	+12.8	+19
	Feb.	-5.4	-2.9	+2.5	+46	56.8	124.0	+67.2	+118
	Mar.	-0.3	1.4	+1.7	+567	84.4	58.2	-26.2	-31
	Apr.	6.7	8.3	+1.6	+24	93.6	74.4	-19.2	-21
	May	12.8	11.6	-1.2	-9	73.5	107.9	+34.4	+47
	June	18.3	18.0	-0.3	-2	71.1	83.8	+12.7	+18
	July	20.7	20.4	-0.3	-1	70.7	83.7	+13.0	+18
	Aug.	19.8	19.7	-0.1	-1	93.1	102.7	+9.6	+10
	Sept.	15.9	15.8	-0.1	-1	80.1	88.6	+8.5	+11
	Oct.	9.9	9.4	-0.5	-5	74.9	91.4	+16.5	+22
	Nov.	3.7	5.3	+1.6	+43	82.4	90.8	+8.4	+10
	Dec.	-2.9	-0.3	+2.6	+90	85.2	177.6	+92.4	+108
<u>Wingham District</u>									
Blyth	Jan.	-7.9	-1.7	+6.2	+78	105.8	108.0	+2.2	+2
	Feb.	-8.2	-3.6	+4.6	+56	67.2	65.1	-2.1	-3
	Mar.	-2.8	+0.6	+3.4	+121	62.7	72.6	+9.9	+16
	Apr.	5.1	8.0	+2.9	+57	71.9	58.6	-13.3	-18
	May	11.8	10.7	-1.1	-9	73.7	106.1	+32.4	+44
	June	17.0	17.2	+0.2	+1	75.0	114.5	+39.5	+53
	July	19.7	19.3	-0.4	-2	76.6	87.5	+10.9	+14
	Aug.	18.8	19.1	+0.3	+2	96.3	78.5	-17.8	-18
	Sept.	15.1	14.9	-0.2	-1	88.4	126.5	+38.1	+43
	Oct.	8.7	9.1	+0.4	+5	90.3	150.5	+60.2	+67
	Nov.	2.5	4.4	+1.9	+76	101.4	163.3	+61.9	+61
	Dec.	-4.3	-1.5	+2.8	+65	116.2	130.0	+14.8	+13

^a based on the 30-year average.